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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS-R9-ES-2012-0034]

[450 003 0115]

RIN 1018-AY68

Endangered and Threatened Wildlife and Plants; Listing the Blue-throated Macaw

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), are listing the blue-throated macaw (*Ara glaucogularis*) as endangered under the Endangered Species Act of 1973, as amended (Act). This species is endemic to a small area in Bolivia, and there are estimated to be fewer than 500 individuals remaining in the wild. Its status remains tenuous despite conservation efforts. Threats to the species include: lack of reproductive success (loss of nestlings) due to nest failure, which primarily is caused by competition for nest sites and predation by larger avian species; and the lack of suitable, available habitat in addition to its small population size.

DATES: This final rule is effective [INSERT DATE 30 DAYS AFTER DATE OF

PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: This final rule is available on the Internet at <http://www.regulations.gov> under Docket No. FWS-R9-ES-2012-0034. Comments and materials we received, as well as supporting documentation used in the preparation of this rule, are available for public inspection, by appointment, during normal business hours at: U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Suite 400, Arlington, VA 22203.

FOR FURTHER INFORMATION CONTACT: Janine Van Norman, Chief, Branch of Foreign Species, Endangered Species Program, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, Room 420, Arlington, VA 22203; telephone 703-358-2171. If you use a telecommunications device for the deaf (TDD), call the Federal Information Relay Service (FIRS) at 800-877-8339.

SUPPLEMENTARY INFORMATION:

Background

The Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*), is a law that was passed to prevent extinction of species by providing measures to help alleviate the loss of species and their habitats. Before a plant or animal species can receive the protection provided by the Act, it must first be added to one of the Federal Lists of Endangered and Threatened Wildlife and Plants. Section 4 of the Act and its implementing

regulations at part 424 of title 50 of the Code of Federal Regulations (CFR) set forth the procedures for adding species to these lists.

Previous Federal Actions

We received the petition to list this species on May 6, 1991, from Alison Stattersfield, of the International Council for Bird Preservation (ICBP). That petition requested that we list 53 foreign birds under the Act, including the blue-throated macaw, which is the subject of this final rule. We took several actions on this petition. On December 16, 1991, we published a positive 90-day finding and announced the initiation of a status review of the species included in the 1991 petition (56 FR 65207). On March 28, 1994, we published a document that served as our 12-month finding on the 1991 petition (59 FR 14496). In that document, we announced our finding that listing 38 species from the 1991 petition, including the blue-throated macaw, was warranted but precluded because of other, higher priority listing actions. The blue-throated macaw was assigned a listing priority number (LPN) of 2. Species are assigned LPNs based on the magnitude and immediacy of threats, as well as their taxonomic status. A lower LPN corresponds to a higher priority to determine a listing status. An LPN of 2 reflects threats that are both imminent and high in magnitude, as well as the taxonomic classification of the blue-throated macaw as a full species. In the May 3, 2011, Annual Notice of Review, we announced that listing was warranted but precluded for 20 foreign species, including the blue-throated macaw.

On January 10, 2013, we issued a proposed rule (78 FR 2239) to add the blue-throated

macaw as endangered to the Federal List of Endangered and Threatened Wildlife.

Summary of Comments

We base this rule on a review of the best scientific and commercial information available, including all information we received during the public comment period. In the January 10, 2013, proposed rule (78 FR 2239), we requested that all interested parties submit information that might contribute to development of a final rule. The public comment period was open for 60 days, ending March 11, 2013. We also contacted appropriate scientific experts and organizations, and invited them to comment on the proposed listing in accordance with our peer review policy, described in the section below. We received 23 comments from members of the public including peer reviewer; these comments are available at <http://www.regulations.gov> under Docket No. FWS-R9-ES-2012-0034).

Peer Review

In accordance with our policy, “Notice of Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities,” that was published on July 1, 1994 (59 FR 34270), we sought the expert opinion of three appropriate independent specialists regarding this rule. The purpose of such review is to ensure listing decisions are based on scientifically sound data, assumptions, and analysis. We sent copies of the proposed rule to the peer reviewers immediately following publication in the **Federal Register**. We invited these peer reviewers to comment, during the public comment period, on the specific assumptions and the

data that were the basis for our conclusions regarding the proposal to list this species as endangered under the Act. We received comments from three peer reviewers.

We reviewed all comments we received for substantive issues and new information regarding the proposed listing of this species; we address those comments below. Comments that provided support or opposition without substantive information were noted, but will not be addressed in this final rule. Some of the commenters did not appear to understand the criteria for listing under the Act. Therefore, we are providing clarification below. The following summarizes the comments we received and our responses.

(1) Comment: Many commenters, while not opposed to the listing of the species, asked for a special rule under section 4(d) of the Act (also called a “4(d) rule”) that would allow interstate trade of the species to occur.

Response: Section 4(d) of the Act allows the Service to develop a special rule to apply the prohibitions of section 9 or to provide measures that are necessary and advisable to provide for the conservation of threatened species. A special rule cannot be promulgated for a species that is listed as endangered under the Act. Because we determined that listing the blue-throated macaw as endangered under the Act is appropriate, we are not able to develop a 4(d) rule for this species. That said, not all interstate trade is prohibited under the ESA. Sale; offer for sale; and delivery, receipt, carrying, transport, or shipment in interstate or foreign commerce in the course of a commercial activity are prohibited. Interstate trade that is not sale, offer for sale, or in the course of a commercial activity is not regulated.

(2) Comment: Several commenters, including individual bird breeders and the American Federation of Aviculture, objected to our finding, but did not provide new information relevant to the determination (for the specific content of these comments, see <http://www.regulations.gov> under Docket No. FWS-R9-ES-2012-0034).

Response: We thank all the commenters for their interest in the conservation of this species and thank those commenters who provided information for our consideration in making this listing determination. Under section 4(b) of the Act, the Service is required to make listing determinations solely on the basis of the best scientific and commercial data available after conducting a review of the status of the species. When we published our proposed rule, we opened a public comment period during which we requested any additional information on the blue-throated macaw. In making this listing determination, we reviewed the best available scientific and commercial information, we contacted species experts, and we diligently searched for the most current information on this species. Therefore, we have obtained and considered the “best scientific and commercial data available” in our listing determination. After careful consideration, we conclude that this species meets the definition of an endangered species under the Act.

Effects of this Rule

Commercial Use

The Act does not prohibit *intrastate* (within a State or U.S. territory) sale, offer for sale, or certain other intrastate activities of an endangered species. But, among other things, it does prohibit *interstate* (between States and U.S. territories) sale, offer for sale, and certain other activities such as transport in the course of a commercial activity of endangered species. If a person in the course of a commercial activity can demonstrate that such sale or other commercial use enhances the propagation or survival of the species, or that it is for scientific research, he or she may apply for a permit for these activities.

Because interstate commercial use of endangered species is generally prohibited, if you wish to sell or otherwise commercially use your macaw(s), you would have to either sell the bird(s) to someone who resides within your home State, commercially use the bird within your State, or apply for a permit for interstate sale or commercial use of your bird(s). In addition, to be in compliance with the Act, any advertisements for the sale of your birds should include a statement that no sale involving parties from another state can be consummated until a permit has been obtained from the Service.

Captive Breeding

The Service does not regulate captive breeding of listed species. This means that you are not prohibited from continuing to breed these birds. However, the Act does prohibit interstate and foreign sales, certain other interstate and foreign commercial activities, imports, and exports *without* a Service permit. Therefore, if you intend to sell any progeny, you will either need to sell them within the State the birds were bred to someone residing in the same State or, if intending to sell the birds outside the State where they were bred, you will need to obtain a Service permit. In addition, to be in compliance with the Act and its implementing regulations at 50 CFR Part 17, any advertisements for the sale of your birds should include a statement that no sale involving parties from another state can occur until a permit has been obtained from the Service. For more information on obtaining such a permit, see <http://www.fws.gov/permits>.

Personal Pets

The Act does not restrict ownership of your personal pet or moving your personal pet across State lines for noncommercial purposes. There are no restrictions on traveling with or transporting legally obtained endangered species within the United States for your own personal use. No permit is required for you to travel or transport your pet macaw(s) within the United States, provided you are not selling or otherwise engaging in a commercial activity with the bird.

Summary of Changes from Proposed Rule

This final rule incorporates changes to our proposed listing based on the comments we received and newly available scientific and commercial information. Peer reviewers generally commented that the proposed rule was thorough and comprehensive. There were different views on what the historical threats to the species were and differences in thoughts on the magnitude of the various factors currently affecting the species. For example, some peer reviewers and commenters indicated that illegal removal from the wild for the pet trade was the most significant factor affecting the species and that habitat loss and competition for nest sites had less of an effect on the species than predation. Others questioned the degree of the effect that botflies have on the species. There are very few individuals studying and working closely with this species, and we made our determinations based on the best available scientific and commercial information. None of the information collected during the comment period changed our final listing determination. A list of literature used in finalizing this determination and comments we received are available at <http://www.regulations.gov>

under Docket No. FWS-R9-ES-2012-0034.

The most significant change is that, based on recent surveys, the population of this species appears to be greater than was previously believed. Recent surveys conducted by the Armonia Association and the Loro Parque Fundación indicate that the wild population of the blue-throated macaw is likely between 350 to 400 individuals (Waugh 2013, pers. comm.; Lebbin 2013, pers. comm.; Hennessey 2013, pers. comm.); including between 190 to 225 mature individuals (Waugh 2013, pers. comm.). Additionally, a population viability analysis on the blue-throated macaw was conducted and published in late 2012 (Strem and Bouzat 2012, pp. 12-24). It was not available at the time we were developing the proposed listing determination; however, this information is incorporated into this final listing determination.

We also note that providing separate legal status to captive specimens of protected species is not permissible under the ESA.

Species Information

Taxonomy

The taxonomic status of this species was disputed until fairly recently. The blue-throated macaw was previously considered an aberrant form of the blue-and-yellow macaw (*A. ararauna*), but these two species are known to occur sympatrically (in the same location) without interbreeding (Kyle 2007a; del Hoyo *et al.* 1997). Common names in Spanish for the blue-throated macaw include guacamayo barba azul and guacamayo caninde. Both BirdLife

International (BLI) and the Integrated Taxonomic Information System (ITIS) recognize the blue-throated macaw as *Ara glaucogularis*. ITIS (<http://www.itis.gov>) is a database maintained by a partnership of U.S., Canadian, and Mexican federal government agencies, other organizations, and taxonomic specialists to provide taxonomic information. Therefore, we accept the species as *Ara glaucogularis*.

Population

As of 1998, the species was known to occur in eight locations, and the total species' population was believed to be 100 to 150 individuals (Loro Parque Fundación (LPF) 2002, p. 13). In October 2004, a new, small population was found at Santa Rosa, 100 kilometers (km) (62 miles (mi)) west of what was believed to be the western-most edge of the species' range (LPF 2012; Herrera *et al.* 2007, p. 18). Biologists surveying for this species in 2004 found more birds than in previous surveys by searching outside known population locations in specific habitat types believed to support the blue throated macaw (palm groves and forested islands) (Herrera *et al.* 2007, p. 18). In 2007, a population of approximately 25 individuals was found one hour south of Trinidad (Kyle 2007a, p. 6). Also in 2007, a flock of approximately 70 birds was observed near the Rio Mamoré (Asociación Armonía), in the vicinity of where the Barba Azul Nature Reserve is now located. Population surveys conducted between 2004 and 2008 by Asociación Armonía and LPF indicate that there are now likely between 350 to 400 individuals (Waugh 2013, pers. comm.).

We note that there are likely more than 1,000 individual blue-throated macaws held in captivity worldwide according to the 2011 North American Regional Studbook (Anderson

2011, p. 4).

Species Description

Blue-throated macaws have a blue throat; a bare, white face containing identifiable blue-streaks; dark grey irises; and a large black bill (Anderson 2011, p. 4; Kyle 2007b, p. 16). Its forehead is also blue, and there is a lack of contrast between its remiges (large flight feathers on the wing) and upperwing covert (outer) feathers. This species is approximately the same size (85 centimeters (cm) or 33 inches) as the blue-and-yellow macaw. However, the blue-throated macaw is not as competitive as the blue-and-yellow macaw in obtaining nesting cavities (Kyle 2007a). Male blue-throated macaws are larger than females at about 800 grams (1.76 pounds), and females weigh approximately 600 grams (1.32 pounds) (Kyle 2007b, p. 16).

Blue-throated macaws, like other parrot species, are monogamous and tend to mate for life (Strem and Bouzat 2012, pp. 12-13). There is also a significant investment in the care for their young; blue-throated macaws are not fully independent of their parents for a full year (Berkunsky 2010, p. 5). Therefore, some breeding pairs may not produce nestlings every breeding season. The blue-throated macaw forms its nests in large tree cavities; its preferred nesting tree is the motacú palm (*Attalea phalerata*), which is native to Bolivia, Brazil, and Peru. The northern population of blue-throated macaws breeds between August to November, and the southern population breeds between November to March (Berkunsky 2012, pers. comm.; Kyle 2007a). The southern population, an hour south of Trinidad, tends to breed around the same time as the more commonly found blue-and-yellow macaw. This overlap of

breeding seasons adds to competition for nest sites.

Blue-throated macaws are sexually mature between 6 and 8 years of age (Strem 2008; Kyle 2007a, p. 6). Females lay one to three eggs per clutch (generally one clutch per year is produced), and the eggs incubate for 26 days. One to three hatchlings are raised, depending on food availability (BLI 2010; Kyle 2007a). Nestlings fledge at between 13 and 14 weeks. Blue-throated macaws are seen traveling mostly in pairs but also have been seen in a large flock of between 70 and 100 individuals (Herrera 2012, pers. comm.; Macleod *et al.* 2009, p. 15; Waugh 2007a, p. 53).

Diet

This species seeks areas where palm fruits and suitable nesting cavities are readily available (Herrera *et al.* 2007, pp. 18-24). It feeds on fruits of approximately 12 species of trees (Kyle 2007a, pp. 1-10). There are 84 species of palms in Bolivia (Moraes *et al.* 2001, p. 234) and approximately 11 palm species within the blue-throated macaw's range. Blue-throated macaws prefer the fleshy part of the fruit, or mesocarp, of motacú and also *Mauritia flexuosa* (royal palms or carandai-guazú), as well as *Acrocomia aculeata* (common names include: coyoli palm, gru-gru palm, macaw palm, acrocome, Coyolipalme, amankayo, corajo, corozo, baboso, tucuma, and totai) (Herrera 2007, p. 20; Yamashita and M. de Barros 1997, p. 144; Jordan and Munn 1993; <http://www.ars-grin.gov>; <http://www.pacsoa.org.au>). The macaws first puncture the apex of the mesocarp and remove the outer layer (Yamashita and M. de Barros 1997, p. 144). The motacú continually produces fruit throughout the year. Between 80 and 90 percent of motacú palms produce fruits all year, but the peak is between

July and December (LPF 2003, p. 21; Moraes *et al.* 1996, p. 424). Motacú is believed to be pollinated by beetles in the *Mystrops* genus (Moraes *et al.* 1996, p. 425). The same palm tree may produce at any one time between three and five racemes (flowering stalks, each with fruits in a different stage of development ripeness) (Yamashita and M. de Barros 1997, p. 144).

The species has also been observed at clay licks (Kyle 2007a, p. 2), which are clay banks where the birds consume soil or minerals; however, the reason for the clay consumption remains unclear.

Range and Habitat Description

The blue-throated macaw is endemic to the tropical savanna ecoregion of north-central Bolivia in the Department of Beni (Strem and Bouzat 2012, p. 13; LPF 2010; Kingsbury 2010, p. 8). This ecoregion is approximately 160,000 square kilometers (km²) (61,776 square miles (mi²)). (See Appendix A in Docket No. FWS-R9-ES-2012-0034 at <http://www.regulations.gov> for a map of the region (hereinafter referred to as “Appendix A”). Within this region, the blue-throated macaw is found both in groups and in widely dispersed isolated pairs within an area estimated to be between 2,508 and 12,900 km² (968 and 4,981 mi²) (Waugh 2013, pers. comm.; Strem and Bouzat 2012, p. 12; LPF 2012; BLI 2012; Hesse 2000, p. 104). The species is found at elevations between 200 and 300 meters (m) (656 and 984 feet (ft)) (Yamashita and M. de Barros 1997, p. 144; Brace *et al.* 1995). The blue-throated macaw’s habitat was occupied by humans for thousands of years before European

colonization (Erickson 2000, p. 2). Its habitat consists of lowlands in an area known as Llanos (plains) de Mojos, also known as Llanos de Moxos (LPF 2010; Mayle *et al.* 2007, p. 301; Yamashita and M. de Barros 1997, p. 141). See Appendix A for a photo representing the flooded habitat. The Llanos de Mojos is a wide savannah plain with poor drainage and, in the wet season, is extremely susceptible to flooding. The floods cover large areas of the plains, and the area may remain flooded for 5 to 7 months in some areas. These plains include parts of the river basins of the Iténez, Mamoré, Beni, and Madre de Dios Rivers (see Appendix A for a map; Yamashita and M. de Barros 1997, p. 144).

The blue-throated macaw's habitat has progressively diminished over thousands of years and its habitat is now primarily restricted to small "islands" of suitable habitat within privately owned cattle pastures (see Appendix A for a photo illustrating these islands; Milpacher 2012, pers. comm.; Kingsbury 2010, p. 72; Berkunsky 2008, p. 4; Kyle 2007a, p. 4; Kyle 2006, p. 7; LPF 2003, p. 6). The species has been observed in flocks of up to 100 birds in the Barba Azul Nature Reserve (Waugh 2013, pers. comm). The blue-throated macaw is believed to occur on ranches adjacent to the Barba Azul Nature Reserve, Ranches Las Gamas, Los Patos, Pelotal, and Juan Latino, but the status of the species is unclear in these areas (Kingsbury 2010, p. 89). In other parts of the species' range, the species is believed to occur on the ranches Elsner with Espíritu, San Rafael, and the Estancia El Dorado; however, to the best of our knowledge, these are privately managed, and the species is not being monitored on the ranches.

Palm Islands

Palm-dominated forest islands form the blue-throated macaw's primary habitat. These "islands" are on elevated terrain and are sometimes referred to as "alturas" (high ground). The islands were primarily formed as mounds resulting from prehistoric human existence in this region (Erickson 2008, pp. 168-169). The lowlands are frequently inundated by water due to the flooding of nearby rivers (see Appendix A). Historically, human cultures manipulated the water flow to create plains that were higher and subsequently drier (Erickson 2008, pp. 168-169). The mounds are common throughout the savannas and wetlands of Bolivia; there may be as many as 10,000 of these mounds or islands in Bolivia (Erickson 2008, p. 169). They have been found to vary in size from a few hectares to many square kilometers (Erickson 2008, pp. 168-169; Yamashita and M. de Barros 1997, p. 144). Most are raised less than one meter and are often surrounded by ponds or moat-like ditches (Erickson 2008, pp. 168-169). Typically, these islands are surrounded by seasonally flooded grasslands; are between 0.2 and 1.0 hectare (ha) (0.49 to 2.47 acre (ac)) in size; and are approximately 130 to 235 m (426 to 771 ft) above sea level (Kingsbury *et al.* 2010, p. 71; Yamashita and M. de Barros 1997, p. 144).

Besides motacú, palm species found on these islands are typically *Syagrus botryophora* (sumuqué) and *Astrocaryum vulgare* (chontilla), interspersed with semi-deciduous emergent trees such as *Enterolobium spp.* (no common name (NCN)), *Sterculia striata* (NCN) and *Tabebuia spp.* (roble), and the Curupau tree (*Anadenanthera colubrina*) (also known as yopo, vilca, huilco, wilco, cebil, or angico) (Kyle 2005, p. 7). Some trees such as *Ceiba pentandra* (mapajo or kapok tree) and *Hura crepitans* (common names include

catahua, Ochoo, arbol del diablo, acacu, monkey's dinner-bell, habillo, ceiba de leche, sandbox tree, possum wood, dynamite tree, ceiba blanca, assacu, and posentri) can reach more than 40 m (131 ft) in height.

The motacú palms may have survived on the mound islands for various reasons: their value to human cultures, their resistance to burning, and their ecological suitability to the microclimate. Motacú is not only vital to the life history of blue-throated macaws; it also has local, commercial, and ecosystem importance (Kyle 2005, p. 3; Moraes *et al.* 1996, pp. 424-425). This species of palm is used in the local community as thatch for housing, which can last up to 7 years. Its fruit is consumed by humans and various other species; parts of the palm tree are used to make baskets and brooms; and palm oil is sold commercially (Zambrana *et al.* 2007, p. 2785; Moraes *et al.* 1996, pp. 425-426).

Significance of Palm Islands to Blue-throated Macaws

Habitat favored by blue-throated macaws contains tall, mature trees in areas with continuous motacú palm fruit production (Yamashita and M. de Barros 1997, p. 145). Densities of motacú, the blue-throated macaw's preferred nesting and feeding source, vary greatly. In the 1997 Yamashita and M. de Barros study, macaws were only observed in areas where motacú represented more than 60 percent of the trees.

Natural cavities in dead or decaying trees (usually motacú palms) are the primary source of nesting sites for this species. Blue-throated macaws prefer dead trees that have cavities with a minimum internal diameter of 30 cm (11.8 inches) for nesting, and, therefore, the tree must have a diameter at breast height of 60 cm (23.6 inches) or greater (see Appendix

A for a picture representing a tree cavity; Yamashita and M. de Barros 1997, p. 145).

Factors Affecting the Species

Section 4 of the Act, and its implementing regulations at 50 CFR part 424, set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, we may list a species based on any of the following five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above factors, singly or in combination. We considered all of these factors in determining that the blue-throated macaw qualifies as an endangered species. Each of these factors is considered and evaluated in this document.

In analyzing threats to a species, the Service focuses its analysis on threats acting upon wild specimens within the native range of the species because the goal of the Act is survival and recovery of the species in its native ecosystems. We do not separately analyze “threats” to captive-held specimens because the statutory five factors are not well-suited to consideration of specimens in captivity and captive-held specimens are not eligible for separate consideration for listing. But we do consider the extent to which specimens held in captivity create, contribute to, reduce, or remove threats to the species.

Loss of Palm Islands Due to Habitat Conversion

Within the past few hundred years, the blue-throated macaw lost much of its remaining habitat due to conversion of palm forests to pasture for cattle grazing. Cattle are not native to Bolivia; they were introduced to Bolivia in the 1600s. After the Second World War, cattle ranching and the associated burning of pastures began significantly impacting the landscape (Robison *et al.* 2000, p. 61). The macaw's preferred habitat is now limited to a few small, isolated islands of suitable habitat that are surrounded by these cattle ranches (Gilardi 2012, pers. comm.). During the flooding season, which can occur for up to 6 months of a year, cattle take refuge on the motacú palm islands because the islands are drier due to their higher elevation (LPF 2003, p. 33). In general, there is no direct conflict between the cattle themselves and blue-throated macaws, but cattle can degrade their habitat by trampling. Adding to habitat loss, in the preferred habitat of the blue-throated macaw where these motacú palms remain (within privately owned cattle ranches), local ranchers typically burn the pastures annually (Berkunsky 2008, p. 4; del Hoyo 1997). This type of burning results in almost no recruitment of native palm trees, which are vital to the ecological needs of the blue-throated macaw (Yamashita and M. de Barros 1997, p. 144). The reduction in habitat (reduced availability of motacú palms) and lack of recruitment of motacú palms is a concern for in the future for blue-throated macaws because it takes several years for motacú palms to be able to produce fruit and to develop into a size suitable for nesting cavities.

As mitigation, local conservation efforts are not only planting trees that provide food for blue-throated macaws, they are also conducting educational efforts directed towards land owners within the range of the blue-throated macaw. Additionally, the Barba Azul Nature

Reserve is currently expanding (to 11,000 ha) (27,181 ac) to include adjacent ranches where the blue-throated macaw is believed to breed. The land newly incorporated into the protected area has more palm islands with better forest (Waugh 2013, pers. comm.). However, projects designed to provide additional habitat for this species are in the early stages of development and it is too early to evaluate the effectiveness of these efforts.

The lack of nesting cavities (suitable habitat) is often a limiting factor for bird species that depend on these cavities for nesting (Sandoval and Barrantes 2009, p. 75; Kyle 2006, p. 8). To raise their young, blue-throated macaws require specific nesting cavities that provide protection from predation and flooding. Additionally, many different species compete for these increasingly rare nest sites. The loss of suitable trees is one factor that has resulted in increased competition from other species for these nesting cavities. The impact of habitat loss is compounded by extreme weather events and contributes to other factors that affect blue-throated macaws, such as an increase in vulnerability to predation and competition for nests.

Nest Failure

Nest failure (the failure of nestlings to survive to fledgling stage) continues for various reasons, despite intensive conservation efforts (Berkunsky 2010, p. 4; Kyle 2006, p. 8). Some of the causes of nest failure include: predation, infestation by botflies (parasites in the *Philornis* genus), exposure to severe weather events such as flooding, and competition for food and shelter with other species such as bees (Berkunsky 2010, pp. 4-5). Many nestlings die in early developmental stages, often due to starvation (due to lack of food or parental neglect, exposure to cold temperatures, or flooding (Kyle 2007a, pp. 1-10). If parents do not

have access to enough nutritional food sources, some nestlings are neglected so that their other nestlings will survive. Nestlings can also fall out of collapsed trees before they have fledged. During five field seasons of closely observing nest sites, 43 percent of the active nests (30 active nests) were predated (Berkunsky 2008, p. 5; Kyle 2007a, pp. 7-8). See additional discussion below under the *Exposure to Extreme Weather Events* section.

Predation

Predation is a key factor limiting this species' population growth in some areas of its range (Kyle 2007a, pp. 3, 6-7; Kyle 2006, p. 8). During one season of observation, all nestlings within three nests of seven active blue-throated macaw nests were lost to predation (Kyle 2007a, pp. 6-8). Because the species has such a small population size with likely fewer than 500 individuals remaining in the wild, losses such as this have a significant effect on the status of the species as a whole. Predators of the blue-throated macaw include:

- Toco toucan (*Ramphastos toco*)
- Crane hawk (*Geranospiza caerulescens*),
- Great-horned owl (*Bubo virginianus*), and
- Southern crested caracara (*Caracara plancus*, a bird of prey).

The blue-throated macaw's habitat of sparse, palm-forested islands scattered among natural grasslands, increases the species' vulnerability to nest predation (Kyle 2007a, pp. 6-7). Tree nest cavities chosen by blue-throated macaws tend to be visible to other avian species flying overhead. In addition to nesting on palm islands, blue-throated macaws are also known to nest in isolated palms in open fields, which are even more exposed than nests on palm

islands (Herrera *et al.* 2007, p. 20). All of the species that predate on adult blue-throated macaws, eggs, or nestlings have large distributions and are commonly found at the habitat islands used by blue-throated macaws (Kyle 2007a, pp. 6-7). Great horned owls have been seen at many sites where blue-throated macaws are nesting (Kyle 2007a, p. 6). These owls, native to South America, have a vast range, are the most widely distributed owl in South America, and occupy a variety of habitats including open forest, farmland, and grassland.

Because blue-throated macaw nests may be concentrated in these small “islands” of trees within cattle pastures, they are more easily located by predators than species that nest in a continuous forest setting. To discourage and mitigate the effects of predation, some conservation activities being conducted include the monitoring and discouragement of predators from attacking blue-throated macaw nests. These efforts are intensive. In one case, where it appeared the nest tree was collapsing, the tree was monitored all night by conservation staff (Kyle 2007a, p. 9). Often trees containing active nests are monitored in this way if persistent predation has been observed. The mitigation efforts are helpful if nestlings can survive until they are at least 300 grams (0.66 pounds), they have a greater chance of survival (Kyle 2007a, p. 7). However, these mitigation projects are in the early stages of development and it is too early to evaluate the effectiveness of these efforts.

Botfly parasites can also cause mortality of nestlings and have been observed in blue-throated macaw nestlings. During some parts of their life cycle, botflies live subcutaneously, and feed on macaw tissue (Olah *et al.* in press; Wunderle Jr. and Arendt 2011, p. 39). Botflies significantly reduce the energy available for nestling growth and development (Uhazy and

Arendt 1986 in Wunderle Jr. and Arendt 2011, p. 39) and can contribute to reduced fitness and in some cases death of nestlings. In one study of avian nestlings, botfly parasitism caused 56 percent of mortalities, while egg and chick losses from nest predators and competitors accounted for less than 10 percent of reproductive failures (Arendt 2000 in Wunderle Jr. and Arendt 2011, p. 39).

Exposure to Extreme Weather Events

Because this species has a small population, the blue-throated macaw is also vulnerable to natural catastrophic events such as flooding, drought, and other stochastic disturbances (Strem and Bouzat 2012, p. 12; Kyle 2006, pp. 5-6). Bolivia is described as a “climatically volatile region” and is one of the countries in the world most affected by natural disasters in recent years (Oxfam International 2009, p. 5). This species’ habitat experiences extreme changes over the course of a year.

For many months of the year, the blue-throated macaw’s habitat is flooded; at other times during the year, its habitat suffers from severe drought. During periods of drought, nestlings are sometimes neglected and starve.

High rainfall occurs during the summer months; the wet season is between September and May. Annual precipitation is between 110 and 250 cm (43 and 98 in) (Haase and Beck 1989 in Kingsbury 2010, p. 9). Very heavy rainfall in this region can continue for long periods of time (Kyle 2006, pp. 5-6; Hanagarth and Sarmiento 1990 in Beck and Moraes, undated). Every 6 to 12 years, 80 to 90 percent of the region is inundated (Beck and Moraes,

undated). Although these areas are seasonally flooded, they are also prone to periods of drought (Kyle 2007a, p. 3; Mayle *et al.* 2007, p. 294; Yamashita and M. de Barros 1997, p. 144).

Severe storms, such as one that occurred in 2005, are described as "nest killers." These severe storms cause the dead palm trees in which the nests have been constructed to collapse or flood (Kyle 2007b, p. 15), which causes nest failure for the season and subsequently no recruitment.

Dead palm trees often collapse in these storms. During the 2006-2007 season, this phenomenon was observed when the nest of one blue-throated macaw pair in a dead motacú palm tree collapsed due to strong winds (Kyle 2007a, p. 4). Although the reason is unclear, these dead palm trees are currently the preferred sites for nest construction by the blue-throated macaw, and the species has strong nest site fidelity (Berkunsky 2012, pers. comm.). The extent to which this behavior is learned and modified is also unclear. However, researchers are working with the blue-throated macaw to introduce nest sites that are safer and less prone to predation and nest failure due to extreme weather events such as flooding (Berkunsky 2010, pp. 4-5).

Flooding, a significant cause of nest failure in the recent past, has not been documented since 2008 at monitored and human-manipulated nests. This is due to one of the conservation measures in place: drilling drain holes in the nests and at the bottom of the dead palm trees to prevent nest flooding. However, flooding can still occur if nests are not

monitored and manipulated.

Competition for Nest Sites

In addition to nest failure, there is a shortage of nests in some areas. As described above, there is little remaining of the preferred habitat of motacú palms. The species appears to “learn” nesting sites, and will re-use nesting locations that they had used in the past (Berkunsky 2010; Kyle 2007a, p. 4). Blue-throated macaws choose to nest in the top of dead motacú palms which provide easy access to their preferred food source. These nesting sites also expose the birds to predation, competition from other species for nests, drought, excessive rainfall, and nest flooding. Many species, in addition to the blue-throated macaw, use the motacú palm for feeding and nesting. In the Llanos de Mojos, there are 21 species of parrots that may compete for nest sites (Kingsbury *et al.* 2010, p. 83; Yamashita and M. de Barros 1997, p. 144). Some species known to compete for nest sites with the blue-throated macaw include the blue and yellow macaw, woodpeckers, and bees (Kyle 2007a, p. 6; LPF 2003, p. 33).

In order to provide more choices for nesting habitat, conservation organizations are installing nest boxes. In 2009, in the Barba Azul Nature Reserve, 46 artificial nests were monitored, in part by video cameras; however, the majority of them (24 nests) were occupied by blue and yellow macaws (LPF 2010, p. 15). Likely due to the larger size of the blue and yellow macaw or perhaps their more aggressive nature, blue and yellow macaws usually win most confrontations for nests (Kyle 2007a, p. 6). During the 2010 field study at the Barba Azul Nature Reserve, researchers also observed that there were a greater number of blue and

yellow macaws using the Barba Azul Nature Reserve than blue-throated macaws (Kingsbury 2010, p. 83). At an area where both species were drinking water, researchers noted that the blue-throated macaws exhibited agitated behavior when blue-and-yellow macaws were nearby (Kingsbury 2010, p. 83). Although the Barba Azul Nature Reserve was established specifically for the blue-throated macaws, other species use the reserve and compete for nesting sites.

As stated earlier, to mitigate this problem, at least two conservation organizations are installing nest boxes to create more available sites for nesting, but despite the past 10 years of conservation efforts and experimentation with nest boxes, nest failure still occurs. In addition to predation, other reasons for nest failure are numerous, which has instigated the experimentation and installation of these nest boxes. Bees and other species continue to compete with blue-throated macaws for these nest boxes. After many years of experimentation, the nest boxes are slowly becoming more effective at providing suitable nesting sites. Blue-throated macaws seem to habituate to certain nesting sites and locations, likely based on food availability and learned behavior.

Although blue-throated macaws have begun to use some of the nest boxes, it has been a slow and tedious process to encourage blue-throated macaws to use these boxes, and the population continues to suffer losses, particularly due to nest failure, which the installation of suitable nest boxes is attempting to alleviate. When nests fail (no nestlings survive that season), a significant amount of effort has been expended by that breeding pair. Because this species has such a small population (likely there are fewer than 500 individuals remaining in

the wild), each nestling survival has great significance to the overall species' status. The effect of the death of each new nestling on the population of blue-throated macaws is devastating to the viability of the population. If the nestlings survive the first season to the point that they fledge, their chances of survival are much greater than when they are new nestlings and are entirely dependent on their parents for survival.

Bees can also make both natural nesting cavities and manmade nest boxes inhospitable for blue-throated macaws (Berkunsky 2008, p. 5). At the beginning of one breeding season, 67 percent of nest boxes monitored were occupied by bees (Berkunsky 2008, p. 5). After being removed, bees had returned within 2 weeks. Most naturally occurring nest sites, because there are so few of them and they are in demand by numerous species, require intense monitoring and manipulation in order to maintain an attractive, suitable environment for blue-throated macaws.

Disease

Macaws are susceptible to many bacterial, parasitic, and viral diseases (Kistler *et al.* 2009, p. 2,176; Portaels *et al.* 1996, p. 319; Bennett *et al.* 1991). Macaws are prone to many viral infections such as retrovirus, pox virus, and paramyxo virus, which can cause weakened immune systems and subsequent death (Gaskin 1989, pp. 249, 251, 252). Recently, an examination of tissue revealed the likely presence of the pox virus in dead blue-throated macaw nestlings, indicating that close contact between blue-throated macaws and domestic poultry may be facilitating pathogen transmission to this species (Wildlife Conservation Society (WCS) *in litt.* 2011). In one location within the limited range of the species, blue-

throated macaws share water sources with chickens, ducks, and other birds (WCS *in litt.* 2011; Kingsbury 2010, p. 83). Blue-throated macaws in this area are being closely monitored to decrease the possibility of transmission of the pox virus; however, it remains a concern.

Proventricular dilatation disease (PDD) is one of the most serious diseases known to affect parrots (Kistler *et al.* 2008, p. 2). PDD, also known as avian born virus (ABV) or macaw wasting disease, is a fatal disease that poses a serious threat to all captive-held and wild parrots worldwide, particularly those with very small populations (Kistler *et al.* 2008, p. 1; Abramson *et al.* 1995, p. 288). This contagious disease causes damage to the nerves of the upper digestive tract, so that food digestion and absorption are negatively affected. The disease has a 100-percent mortality rate in affected birds, although the exact manner of transmission between birds is unclear (Kistler *et al.* 2008, p. 1). PDD has been documented in several continents in more than 50 different parrot species and in free-ranging species in at least five other orders of birds (Kistler *et al.* 2008, p. 2). This disease is concerning because blue-throated macaws share water sources with other species of birds, and this disease could be transmitted between individuals that are within close range.

This species is closely monitored in the wild; conservationists working with this species are taking precautions so that diseases are not introduced into the wild population. Despite close monitoring and precautions, disease is likely to affect this extremely small population; therefore, we are concerned that diseases will become problematic to this species in the wild. At this time, we do not find that disease is contributing to the risk of extinction of blue-throated macaws, but it may affect this species in the future.

Small Population Size

An additional factor that affects the continued existence of this species is its small, declining population of likely fewer than 500 individuals in the wild. Recently, two observations have been made: (1) Malformations in chicks, and (2) reduced fertility in many reproductive pairs (WCS *in litt.* 2011). Small, rapidly declining populations of species, combined with other threats such as reduced reproductive success, lead to an increased risk of extinction (Strem and Bouzat 2012, p. 22; Harris and Pimm 2008, p. 169).

Species tend to have a higher risk of extinction if they occupy a small geographic range and occur at low density (Purvis et al. 2000, p. 1949). A small, declining population size renders a species vulnerable to any of several risks including inbreeding depression, loss of genetic variation, and accumulation of new mutations. A species' small population size, combined with its restricted range may increase the species' vulnerability to adverse natural events and manmade activities that destroy individuals and their habitat (Holsinger 2000, pp. 64-65; Young and Clarke 2000, pp. 361-366; Primack 1998, pp. 279-308). Extinction risk is heightened in small, declining populations by an increased vulnerability to the loss of genetic variation due to inbreeding depression and genetic drift (changes in relative frequency of gene sequences). This, in turn, compromises a species' ability to adapt genetically to changing environments (Frankham 1996, p. 1507) and reduces fitness, thus increasing extinction risk (Reed and Frankham 2003, pp. 233-234). Inbreeding can have individual or population-level consequences either by increasing the phenotypic expression (the outward appearance or observable structure, function, or behavior of a living organism) of recessive, deleterious

alleles (harmful gene sequences) or by reducing the overall fitness of individuals in the population (Charlesworth and Charlesworth 1987, p. 231; Shaffer 1981, p. 131).

Strem and Bouzat indicated in their population viability analysis (PVA) that continuing threats, such as declines in abundance, small population size, and low population growth rates, make this species highly vulnerable to any change (2012, p. 12). Their study indicated that even small increases in habitat loss (2 percent) and population harvesting (3 percent) had severe effects on the population (2012, p. 12). We note that Strem and Bouzat conducted the PVA simulations using only published data on the blue-throated macaw population size (2012, p. 13). However, even considering the recent discovery of a new population, the researchers indicated that “multiple anthropogenic factors threaten the species’ survival over the long term” (Strem and Bouzat 2012, p. 22). They noted that the results showed that the blue-throated macaw has a relatively low probability of extinction over the next 50 years. However, they also noted that after the 50- to 100-year period considered for the simulations, population decreased considerably to approximately half of the initial abundance (Strem and Bouzat 2012, p. 22).

This species faces many challenges: it has many predators, limited suitable habitat, and competition from other species for nest sites, in addition to its small population size. Any loss of potentially reproducing individuals could have a devastating effect on the ability of its population to increase. Small populations have a higher risk of extinction due to random environmental events (Shaffer 1987, pp. 69–75; Gilpin and Soule 1986, pp. 24–28; Shaffer 1981, p. 131). Because of its small population and restricted range, the blue-throated macaw

is vulnerable to random environmental events; in particular, it is threatened by extreme precipitation events and nest flooding.

Removal from the Wild

Removal of macaws from the wild over the past few hundred years contributed to this species' small population size (LPF 2012; Herrera and Hennessey 2009, p. 233; Kyle 2007a). Macaws, both live and dead, have been a significant part of Bolivian culture for thousands of years. Evidence of this exists in pre-Colombian Andean feather art (American Museum of Natural History 2012). Feathers have been used historically in headdresses, and parrots have been used in ceremonial sacrifices (American Museum of Natural History 2012; Berdan 2004, p. 4; Creel and McKusick 1994, pp. 510-511). Feathers of blue-throated macaws would still be used for headdresses today if it were not for intervention and education programs implemented by nongovernmental conservation organizations (NGCOs) (BLI 2012; LPF 2010; LPF 2003, p. 29). In addition to being used in ceremonies and costumes, there is evidence that parrots have been household pets since at least A.D. 1000 (Creel and McKusick 1994, pp. 513-515) as evidenced in burial remains; live macaws likely had commercial value even during that time period. Parrots were traded over long distances; archeological remains indicate that parrots were found well outside their native range (Creel and McKusick 1994, pp. 515-516).

Historically, the most significant impact to the decline of this species' population was likely due to collection of birds from the wild during the late 1800s and early 1900s (Yamashita and M. de Barros 1997, p. 144). During this time period, bird-skin traders of

European descent sold thousands of bird skins, particularly in the United States, for at least three generations (Yamashita and M. de Barros 1997, p. 144; Trimble 1936, pp. 41-43).

The Inadequacy of Existing Regulatory Mechanisms

Under the Act, we are required to evaluate whether the existing regulatory mechanisms are adequate. There are limited regulatory mechanisms in place to protect this species (de la Torre *et al.* 2011, p. 334; Herrera and Hennessey 2007, p. 295; LPF 2003, pp. 6-7). This species is considered critically endangered by the International Union for Conservation of Nature (IUCN) (BLI 2012; LPF 2012). However, IUCN rankings do not confer any actual protection or management. This species is listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (CITES 2012). CITES regulates international trade in animal and plant species listed under the Convention. For additional information on CITES, visit <http://www.cites.org>. An Appendix-I listing includes species threatened with extinction whose trade is permitted only under exceptional circumstances, which generally precludes commercial trade. These protections under CITES were put in place for the blue-throated macaw because the species had suffered substantial population declines throughout its range due to habitat destruction and overexploitation.

The government of Bolivia has enacted various laws and regulatory mechanisms to protect and manage wildlife and their habitats in Bolivia. For example, the Bolivian Government prohibits and imposes sanctions against the possession and the trafficking of any protected species, such as the blue-throated macaw (LPF Recovery Plan 2003, p. 7).

Additionally, the CITES listing and the ban by the Bolivian Government in 1984 to export this species effectively limit legal international trade (LPF 2012; Herrera and Hennessey 2009, pp. 233-234; LPF Recovery Plan 2003, p. 7). However, even after the export of this species was prohibited in the 1980s, and despite the laws in place and the intense conservation efforts ongoing for this species, localized illegal trade is still occurring.

International trade in this species is now negligible (<http://www.unep-wcmc.org>, accessed June 4, 2012). International trade of the blue-throated macaw was initially restricted by the listing of the species in Appendix II of CITES in 1981, and in 1983, the species was transferred from Appendix II to Appendix I. The World Conservation Monitoring Centre (WCMC) at the United Nations Environment Programme (UNEP) manages a CITES Trade Database on behalf of the CITES Parties. Each Party to CITES is responsible for compiling and submitting annual reports to the CITES Secretariat regarding their country's international trade in species protected under CITES. Data obtained from UNEP-WCMC (<http://www.unep-wcmc.org/citestrade>) show that during the 2-year period (1981-1982) that the blue-throated macaw was listed in Appendix II, a total of 29 specimens (all live birds) were legally exported from Bolivia. The trade database indicates that a total of 84 specimens (all live birds) have been exported from Bolivia since the species was listed in Appendix I in 1983, with no specimens traded between 1993 and 2010). The CITES database does not indicate any trends in the trade data to cause concern.

In addition to Bolivia's restrictions and the trade restrictions implemented through CITES, the Wild Bird Conservation Act (WBCA) that was enacted in 1992 in the United

States may have assisted in dampening the demand for this species. The purpose of the WBCA is to promote the conservation of exotic birds and to ensure that importation of exotic birds into the United States does not negatively affect wild populations. The WBCA generally restricts the importation of most CITES-listed live or dead exotic birds except for certain limited purposes such as zoological display or cooperative breeding programs. Import of dead specimens is allowed for scientific specimens and museum specimens. The Service may approve cooperative breeding programs and subsequently issue import permits under such programs. Wild-caught birds may be imported into the United States if certain standards are met and they are subject to a management plans that provides for sustainable use. Parrot imports to the United States were already declining before the enactment of the WBCA, but the WBCA contributed to curtailing the import of wild parrots.

Although international trade is not a concern, poaching for local sale continues to occur (LPF 2012; Herrera and Hennessey 2009, p. 233; Kyle 2007a). Although Bolivia banned the export of live parrots in 1984 (Brace et al. 1995, pp. 27-28), localized illegal trade within South America continued to occur, although it became less frequent (Herrera and Hennessey 2009, p. 233). For example, in 1993, investigators reported that an Argentinian bird dealer was offering Bolivian dealers a “high price” for blue-throated macaws (Jordan and Munn 1993, p. 695).

More recently, a study of markets in Santa Cruz, Bolivia estimated that over 22,000 individuals of 31 parrot species were illegally traded during 2004-2005, despite Bolivian laws (Herrera and Hennessey 2007, p. 298). Bolivian Law 1333 (Ministerio de Desarrollo

Sostenible y Planificación 1999), Article 111 states that all persons involved in trade, capture, and transportation without authorization of wild animals will suffer a 2-year prison sentence together with a fine equivalent to 100 percent of the value of the animal. This law is supported by an addendum that states that all threatened species are of national importance and must be protected (Herrera and Hennessey 2007, p. 295). Asociación Armonía (a nonprofit organization in Bolivia) monitored the trade of wild birds that passed through a pet market in Santa Cruz, Bolivia between July 2004 to December 2007 (Herrera and Hennessey 2009, p. 233; Herrera and Hennessey 2007, p. 295). During the 2004-2005 study period, none of the parrots found were blue-throated macaws. In 2006, two blue-throated macaws were found for sale (Herrera and Hennessey 2009, p. 233). However, the blue-throated macaw was absent in the market during the monitoring period prior to 2006, and no blue-throated macaws were found for sale in this market in 2007 (Herrera and Hennessey 2009, p. 233; Herrera and Hennessey 2007, p. 295). This absence of the species in the market may be due either to the effectiveness of the ongoing conservation programs and laws in Bolivia, or it may be indicative of the scarcity of blue-throated macaws in the wild. Ninety-four percent of the birds documented were believed to be wild-caught. This illegal activity occurs despite the national laws that ban unauthorized trade (Herrera and Hennessey 2007, p. 298).

The high value of this species could lead to continued illegal trade. An internet search indicated that captive-bred specimens of this species sell for between \$1,500 and \$3,000 in the United States (<http://www.hoobly.com>, accessed September 13, 2010). One search advertised that this is a “very rare species and there are only 300 left in the wild.” However, alternatively, because these birds are not difficult to breed in captivity, the supply of captive-

bred birds has increased, which some experts believe may be alleviating illegal collection of wild birds (Waugh 2007a).

Removal of blue-throated macaws from the wild can have a particularly devastating effect given their low reproductive rate and slow recovery from various environmental pressures (Lee 2010, p. 3; Wright *et al.* 2001, p. 711). Some blue-throated macaws have even been used for fish bait (Kyle 2007a, p. 7). The remains of a blue-throated macaw were found near a lake stuffed into a tree cavity with a bag of salt (Kyle 2007a, p. 7). Because this species has so few individuals remaining, any removal from the wild is extremely detrimental to the survival of the species when considered with all of the other factors acting upon the species.

Other Factors

An additional factor that affects the nesting success of blue-throated macaws is the availability of food sources—not only the abundance of food, but the timing of its availability. Phenology (how the timing of plant life cycle events interacts with animal biological processes) is influenced by variations in climate. The timing of motacú palm fruit production is critical for various life stages of the blue-throated macaw, particularly during the period following hatching. The motacú palms, on which blue-throated macaws depend for nesting as well as feeding, are affected by drought, burning, and excessive rainfall. In years when there is significant drought or excessive rainfall, the fruiting abundance and timing of fruit production can significantly affect the success of nestlings, or it can prohibit blue-throated macaws from even attempting to nest (Kyle 2007). In some seasons when food is not as plentiful, breeding pairs may choose not to brood, and the weakest of the nestlings are

neglected by its parents and die of starvation (Kyle 2007a, pp. 4-5). During these times, in some cases, the diet is supplemented by these conservation organizations; however, it is a very intensive process.

In summary, there are many factors that are causing stress to this species' population in the wild. It is affected by several factors such as habitat loss and degradation (factor A), poaching to a limited extent (factor B), predation (factor C), and nest flooding and lack of nest sites in part due to competition from other species but also due to habitat loss and degradation (factor E). Despite numerous laws and regulatory mechanisms to administer and manage wildlife and their habitats, existing laws are inadequate (factor D) to protect the species and its habitat from these other factors. Combined with its reduced population size, the species lacks sufficient redundancy and resiliency to recover from present and future threats without intervention and intense conservation actions. This was corroborated by the recent PVA conducted in 2012, regarding the viability of the population of the blue-throated macaw (Strem and Bouzat 2012, p. 22). Overall, the researchers indicate that population growth rates are likely not at replacement levels because the species has undergone a rapid population reduction over the past 50 years, in part due to habitat loss and poaching (Strem and Bouzat 2012, p. 20). The PVA found that growth rate estimates do not reach the rate of replacement necessary to maintain the viability of population over the long term (Strem and Bouzat 2012, p. 20), making the species particularly vulnerable to any change or threat. These factors acting on the species are expected to continue into the future.

In-situ Conservation

This species is considered by many organizations to be the most endangered macaw remaining in the wild (BLI 2012; World Parrot Trust (WPT) 2012; LPF 2010; LPF 2003, p. 4). Several NGCOs are working intensely on various conservation projects to protect this species and its habitat. Various NGCOs have been involved in the conservation of this species since 1995, with authorization from the Bolivian Government (Waugh 2013, pers. comm.; Gilardi 2012, pers. comm.; LPF 2002, p. 10). NGCOs involved include Asociación Armonía (Bolivia's BirdLife International partner), the Loro Parque Fundación (LPF), and WPT. A species recovery plan that provides the basis for the blue-throated macaw conservation program was approved by Bolivia's Ministry for Sustainable Development in 2004, and has been in place since then (LPF 2003, pp. 6-7).

Within its breeding range, a multitude of efforts are in progress to conserve the species (Waugh 2013, pers. comm.; Gilardi 2012, pers. comm.; Berkunsky 2010, p. 5, Kyle 2007, pp. 1-11). Conservation measures include constant monitoring, protection, and manipulation of nests; supplementing nestlings' diet when food sources are scarce; agreements with private landowners to protect this species' habitat; patrolling existing macaw habitat by foot and motorbike; and monitoring the Beni lowlands for additional populations (LPF 2012; Kyle 2007a; Snyder *et al.* 2000). NGCOs have implemented cooperation agreements with the Federation of Cattle Farmers of the Beni (FEGABENI) and the local authorities in Trinidad, Bolivia (LPF *et al.* 2003, p. 6).

Land acquisition to expand protected habitat for this species has been funded by the

World Land Trust and the Loro Parque Fundación (Waugh 2013, pers. comm.). In 2008, Asociación Armonía and LPF purchased a 3,555-ha (8,785-ac) reserve for the purpose of establishing a protected area for the blue-throated macaw (World Land Trust 2010, <http://www.worldlandtrust-us.org>, accessed July 16, 2010; BLI 2008). In 2010, the Barba Azul Nature Reserve (“Reserve”) was expanded by 1,123 ha (2,775 ac), creating a total protected area for the blue-throated macaws of 4,664 ha (11,525 ac) (Asociación Armonía 2012). Currently, this Reserve is the only protected area designated for the blue-throated macaw. The legal protections that apply fall under Bolivian Law 1333 (Ministerio de Desarrollo Sostenible y Planificación 1999), Article 111. This Reserve protects savanna habitat, and habitat restoration is occurring in the Reserve, although it is unclear the extent the Reserve is used by blue-throated macaws. The actual protections in place include monitoring of habitat, local education and awareness programs about the species, and establishment of suitable nesting sites. Approximately 70 blue-throated macaws have been observed in or around this Reserve (Herrera 2012, pers. comm.); however, these macaws may be some of the same macaws that are observed in other parts of the species’ range during the breeding season (Berkunsky 2012, pers. comm.).

Despite the existence of the Reserve, there are no nests in the Reserve that are known to be occupied by blue-throated macaws (Herrera 2012, pers. comm.). Although the species is present in the Barba Azul Nature Reserve, it has not yet been shown to be breeding there (Waugh 2013, pers. comm.). There is evidence that they use the Reserve for feeding (Herrera 2012, pers. comm.; Kingsbury 2010, pp. 69-82). New information provided indicates that the blue-throated macaws that inhabit this Reserve and adjacent ranches are different than the

birds in the southern portion of its range (see Appendix A for a map of the species' range; Strem and Bouzat 2012, p. 23; Milpacher 2012, pers. comm.; Herrera 2012, pers. comm.). Other than the Barba Azul Nature Reserve, there are no protected areas in the Llanos de Mojos except the Beni Biosphere Reserve, which has been in existence since 1986. However, to our knowledge, the blue-throated macaw does not use the Beni Biosphere Reserve (Hesse and Duffield 2000, p. 258).

In addition to conservation efforts, the NGCOs working in Bolivia are conducting field research to better understand the current state of this species. However, the conservation work is difficult due to various factors that affect the species. Because some of this species' habitat is flooded for 6 months of the year, monitoring its habitat is difficult during certain seasons (Berkunsky 2010, p. 5). There have also been discussions of reintroducing captive-raised birds into the wild; however, this practice could inadvertently introduce disease into the wild population if precautions are not taken to minimize the transmission of disease to other blue-throated macaws (Sainsbury *et al.* 2012, p. 442).

Another conservation measure in place is research on the motacú palm (Milpacher 2012, pers. comm.) because the number of motacú palms is decreasing. This palm species plays a significant role in the life cycle of the blue-throated macaw. One study found that the old and senescent motacú palms are significantly more abundant than the younger palms (LPF 2003, p. 21). Based on their findings, researchers concluded that the islands containing motacú are not regenerating motacú palms sufficiently. It is likely that the lack of regeneration is due to overgrazing by cattle and excessive use of fire over centuries (Kyle

2006, p. 5). The World Parrot Trust has recently attempted several small-scale palm germination experiments to assess reestablishing palm habitat (Milpacher 2012, pers. comm.). The motacú palm has commercial value in addition to its ecological role. Palm trees are used for a multitude of purposes, such as thatch for housing, fruit, and palm oil (de la Torre *et al.* 2011, pp. 327–369; Zambrana *et al.* 2007, pp. 2771-2778). Motacú palm-dominated islands may have persisted in part due to their various ecological and commercial values, but they certainly persist in part because the islands are raised areas within the lowlands that are prone to flooding. With respect to the short term, local researchers believe that there will be adequate motacú fruits in the region for a few more decades (LPF 2003, p. 21); however, research on the motacú is vital to the conservation of the blue-throated macaw.

Educational awareness programs are in place in addition to research and monitoring. As an example, the Asociación Armonía is involved in an awareness campaign to encourage that the protection and conservation of these birds occurs at a local level (e.g., protection of macaws from trappers and the sustainable management of key habitats, such as palm groves and forest islands, on private property) (Llampa 2007; BLI 2008a; Snyder *et al.* 2000). Two educational awareness centers have been established in the towns of Santa Ana del Yacuma and Santa Rosa del Yacuma (LPF 2010, p. 16). In response to the limited but continued poaching that occurs in the wild, LPF initiated a travelling exhibition, “Extinction is Forever,” which visited 17 urban localities in Bolivia in 2010 (LPF 2010, p. 15). The exhibition includes 21 photographs that explain the ancestral and present-day relationship between people and birds, and highlights the effects of illegal trade of wild birds in Bolivia currently. An estimated 1,000 visitors attended each showing in the main cities (LPF 2010, p.

15).

Reproductive success is vital to the blue-throated macaw's recovery, and this species faces many challenges to successfully reproducing. This species' nests often have an open crown (i.e., no roof) and are prone to flooding (Berkunsky 2010, p. 4; Kyle 2007a, p. 3). During many seasons, nests, eggs, and nestlings are destroyed due to flooding. Both WBT and Asociación Armonía have been conducting conservation activities, such as installation of artificial nest boxes that provide safe habitat, manipulating nests so that they do not flood, and discouraging predators and nest competitors. The installation of a multitude and variety of nest boxes is a way to boost breeding success. Because many other species compete for these nest boxes, and blue-throated macaws tend to re-use previously used nesting sites, the process of introducing nest boxes and encouraging blue-throated macaws to use them, while discouraging other species from using them, is a very time-intensive process. Despite all of these conservation efforts, fewer than 500 individuals of this species are believed to remain in the wild. In summary, the conservation efforts underway are abundant, but will need to continue in order to have lasting impacts on the species.

It is our policy that we do not consider captive-held specimens in our analysis of the five factors under Section 4(a) of the Act; we do not believe that it was within the Congressional intent when the Act was written, unless there is some obvious reason for doing so. For additional background on our interpretation of the provisions of the Act, see 78 FR 35204, June 12, 2013. We do not believe that captive-held members of blue-throated macaws either create or contribute to threats to the species or remove or reduce threats to the

species. There are likely more than 1,000 individual blue-throated macaws held in captivity worldwide according to the 2011 North American Regional Studbook, however, many of these birds are of uncertain origin (Anderson 2011, p. 4). We also note that it is not possible to separate captive-held specimens as a different legal status under the Act.

Finding (Listing Determination)

In assessing whether the blue-throated macaw meets the definition of an endangered or threatened species, we considered the five factors in section 4(a)(1) of the Act. A species is “endangered” for purposes of the Act if it is in danger of extinction throughout all or a significant portion of its range and is “threatened” if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. In considering what factors might constitute threats to a species, we must look beyond the mere exposure of the species to the factor to evaluate whether the species may respond to the factor in a way that causes actual impacts to the species. If there is exposure to a factor and the species responds negatively, the factor may be a threat and we attempt to determine how significant a threat it is. The threat is significant if it drives, or contributes to, the risk of extinction of the species such that the species may warrant listing as endangered or threatened as those terms are defined in the Act. We conducted a review of the status of this species and assessed whether the blue-throated macaw is endangered or threatened throughout all or a significant portion of its range.

We have assessed the best scientific and commercial information available regarding the past, present, and future threats affecting this species. Historically, the blue-throated macaw existed in much higher numbers in more continuous, connected habitat; its suitable habitat is now extremely small. Its small population size, combined with its restricted range, increases the species' vulnerability to adverse natural events that destroy individuals and their habitat. It is subject to inbreeding depression, loss of genetic variation, and accumulation of new mutations. In addition to its small population size, many factors currently affect blue-throated macaws. These include: Inadequate nest sites (both in abundance and effectiveness); nest (clutch) failure (when one or all of the nestlings fail to survive to fledgling stage due to a variety of reasons such as starvation, inadequate nutrition, sibling competition); nest flooding; botflies; competition for nests with more competitive species, such as bees, and other avian species, such as large woodpeckers and other macaw species; and predation by numerous species, particularly other bird species (such as toucans, owls, vultures, other raptors, and even other macaw species). Regulatory mechanisms are ineffective at reducing the factors affecting the blue-throated macaw (Factor D).

We have determined that captive-held specimens cannot be given separate consideration under the ESA based on their captive state (see 78 FR 35204, June 12, 2013), but captive-held specimens can, in some cases, create, contribute to, reduce, or remove threats to the species. We have no information in this case indicating that captive-held blue-throated macaws either create or contribute to threats to this species or remove or reduce threats to the species. Due to the effectiveness of CITES and, in the United States, the WBCA, international trade for pets is not a concern. Removal of some birds from the wild for the pet

trade may still be occurring, but there is no information indicating to what extent animals currently held in captivity are motivating poachers to capture and remove additional birds from the wild. Regarding whether captive-held birds reduce any threats to the species, there are likely more than 1,000 individual blue-throated macaws held in captivity worldwide according to the 2011 North American Regional Studbook. However, many of these birds are of uncertain origin (Anderson 2011, p. 4) and may harbor diseases that do not exist in the wild population and therefore may not be suitable for reintroduction efforts.

Our review of the information pertaining to the five threat factors supports a conclusion that these factors place the blue-throated macaw in danger of extinction throughout all of its range, such that a listing of endangered is warranted. The species is currently in danger of extinction because the species exists at such low levels that it is vulnerable to a multitude of threats. Given the species' low reproductive capacity, it is very difficult to increase to the levels of abundance that allow the species to withstand such events. All of these factors are now and will continue to result in threats to the continued existence of the species. We also examined the blue-throated macaw to analyze if any other listable entity under the definition of "species," such as subspecies or distinct population segments, may qualify for a different status. However, because of the magnitude and uniformity of the threats throughout its range, we find that there are no other listable entities that may warrant a different determination of status. Since threats extend throughout its entire range, it is unnecessary to determine if the blue-throated macaw is in danger of extinction throughout a significant portion of its range.

Based on our evaluation of the best available scientific and commercial information and given its current population size, and severely limited distribution throughout its historical range, we have determined the species is in danger of extinction throughout all of its range and thus meets the definition of an endangered species. Because the species is in danger of extinction now, as opposed to in the foreseeable future, the blue-throated macaw meets the definition of an endangered species rather than a threatened species. Therefore, we are listing the blue-throated macaw as endangered under the Act.

Available Conservation Measures

Conservation measures provided to species listed as endangered under the Act include recognition, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and encourages and results in conservation actions by Federal and State governments, private agencies and interest groups, and individuals.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to all endangered wildlife. These prohibitions, at 50 CFR 17.21, in part, make it illegal for any person subject to the jurisdiction of the United States to “take” (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or to attempt any of these) within the United States or upon the high seas; import or export; deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of commercial activity; or sell or offer for sale in interstate or foreign commerce any endangered wildlife species. It also

is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken in violation of the Act. Certain exceptions apply to agents of the Service, other Federal land management agencies, the National Marine Fisheries Service, and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving endangered wildlife species under certain circumstances. Regulations governing permits for endangered species are codified at 50 CFR 17.22. With regard to endangered wildlife, a permit may be issued for the following purposes: For scientific purposes, to enhance the propagation or survival of the species, and for incidental take in connection with otherwise lawful activities.

Clarity of Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

- (a) Be logically organized;
- (b) Use the active voice to address readers directly;
- (c) Use clear language rather than jargon;
- (d) Be divided into short sections and sentences; and
- (e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in the **ADDRESSES** section. To better help us revise the rule, your comments

should be as specific as possible. For example, you should tell us the names of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

National Environmental Policy Act (NEPA)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), need not be prepared in connection with regulations adopted under section 4(a) of the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

A list of all references cited in this rule is available on the Internet at <http://www.regulations.gov> under Docket No. FWS-R9-ES-2012-0034 or upon request from the Branch of Foreign Species, Endangered Species Program, U.S. Fish and Wildlife Service.

Author

The primary author of this rule is Amy Brisendine, Branch of Foreign Species, Endangered Species Program, U.S. Fish and Wildlife Service.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361-1407; 1531-1544; and 4201-4245, unless otherwise noted.

2. Amend § 17.11(h) by adding a new entry for “Macaw, blue-throated” in alphabetical order under BIRDS to the List of Endangered and Threatened Wildlife to read as follows:

§17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
***** BIRDS							

Macaw, blue- throated	<i>Ara</i> <i>glaucoocularis</i>	Bolivia	Entire	E	814	NA	NA

* * * * *

Dated: September 20, 2013.

Rowan W. Gould,

Acting Director, U.S. Fish and Wildlife Service.

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